**Improving genetic transformation efficiency in legumes**

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In the 1990s plant genetic transformation emerged as an important technological advancement in modern science: enabled novel insights into plant biology and initiated a new era in crop improvement [1]. Yet, for legume crops, efficient transformation and complete plant regeneration remain a challenge and limit the application of gene-editing technologies [2].

Here, we explore two methods to increase genetic modification efficiency in subterranean clover and mungbean: i) plant growth regulators during in vitro multiplication and rooting, and ii) the effect of light during Agrobacterium – explant co-cultivation. The in vitro regeneration protocols developed here are modifications of current protocols. We achieved up to a 100% regeneration rate, with rooting achieved in 8 out of 10 isolated shoots: all survived transfer to ex vitro conditions. We implemented these protocols during genetic transformation of both species using plasmids harbouring Hygromycin or Kanamycin resistance genes. During co-cultivation three light spectra (fluorescent, red-enriched, and blue-enriched) were tested, after that period explants were cultured under fluorescence and/ or red-enriched light. In both species, higher regeneration rates (30% to 44%) were achieved under fluorescence and red-enriched after 14 days on selection media compare to blue-enriched (20%). In clover, the transformation efficiency (number of independent rooted shoots after selection per one hundred treated explants) was up to 15% under red-enriched and 4% under fluorescence. Further experiments are underway to corroborate these results.

This project will provide a cost-effective, reliable protocol for boosting fundamental studies on gene function and facilitate crop improvement of species previously regarded as recalcitrant to genetic modification.

***References:***

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